

claimed. See, e.g., *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991); *Manual of Patent Examining Procedure (MPEP)* §2163.02. However, The subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement. *MPEP* §2163.02.

As noted at page 2, lines 14-16 of applicants' specification, "in stage a), the first solvent can comprise between 20 % and 95 % by weight of amine and, in stage b), the second solvent can comprise at least 95 % by weight of amine." Clearly, when the first solvent includes less than 95 % by weight of amine, it is a different solvent having a different amine concentration than the second solvent, which includes at least 95 % by weight of amine. Also, clearly when the when the second solvent includes more than 95 % by weight of amine, it is a different solvent having a different amine concentration than the first solvent, which includes between 20 % and 95 % by weight of amine. This is further supported by the disclosure at page 6, lines 4-15, especially lines 11-3 and page 7, lines 17-19 of applicants' specification wherein it is disclosed, e.g., that The regenerated solvent (a first part of which is cooled and fed through line 5 to the top of absorption zone 3) "can consist of an aqueous solution containing ... preferably between 20 % and 80 % by weight of amine" while "[t]he solvent introduced through line 6 is rich in amine, i.e. it contains at least 90 % and preferably more than 95 % or 98 % by weight of amine." Clearly these two solvents can be different and can have different amine concentrations. Accordingly, the specification satisfies the written description requirement of 35 U.S.C. §112, first paragraph with respect to claims 17 and 18.

Claims 1-15 (and apparently claims 17-20 also) stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,462,721 to Pounds et al. Applicants again traverse this rejection and request reconsideration thereof.

The present invention relates to a method for treating a natural gas containing H<sub>2</sub>S. The method comprises at least two steps. First, the natural gas is contacted with a first solvent comprising between 20% and 95% by weight of amine so as to obtain an H<sub>2</sub>S-depleted gas and an H<sub>2</sub>S laden solvent. However, after this first contact, the gas does not conform to the water specification. That is, the gas has absorbed water contained in the first solvent during the first contact. Therefore, the gas must be dehydrated before use.

The second step of the method is carried out in order to dehydrate the gas. That is, the gas is dehydrated by contacting it with a second solvent comprising at least 90% by weight of amine so as to obtain a water-depleted gas and a water-laden solvent. After this second contact, the gas is water-depleted, that is, the water is absorbed by the second solvent.

The method according to the present invention can be carried out with a single circuit of solvent, i.e., the first and second solvent can be issued from the same single circuit, the second solvent being obtained at a higher purity than the first solvent.

The Pounds et al. patent discloses a hydrogen sulfide scavenging process. It is disclosed that the levels of hydrogen sulfide and or organic sulfides present in gaseous or liquid hydrocarbon streams or mixtures thereof are reduced by contacting the streams with a scavenging composition comprising the reaction product of aminoethylpiperazine, an alkanolamine, an etheramine, a polyalkylenearmine, or a polyoxyalkylenearmine with C1 to C4 aldehyde. The

solubility of polyamine/aldehyde reaction products is increased by the presence of an enhancing amine/aldehyde reaction product.

A first difference between the present invention and the process of Pounds et al. is that the present invention proposes to contact the gas with a solvent comprising an amine whereas the Pounds et al. patent proposes to contact the gas with a scavenging composition comprising the reaction product of a dialdehyde and an alkanolamine. The reaction product of a dialdehyde and an alkanolamine is clearly different from an amine. Pounds et al. mention, at column 6, lines 18-20, one of the components of the reaction: the monoethanolamine. This solution containing about 85% monoethanolamine in water reacts with a solution containing about 40% ethanedial in water (see column 6, lines 10-15) in order to form the reaction product contacted with the gas.

The scavenging compounds are prepared by reaction between two compounds: (1) a blend of amine and (2) an aldehyde. The scavenging compounds are obtained by chemical reaction that modifies the structure of the reactants (i.e., a blend of amine and aldehyde). The teaching of Pounds et al. cannot be interpreted as contacting the stream with an amine. The Pounds et al. patent teaches merely to contact the stream with the scavenging compounds, whereas the present invention proposes to contact a natural gas with a solvent comprising between 20% and 95% by weight of amine.

Applicants reiterate that the reaction product of an aldehyde and an alkanolamine (as described in Pounds et al.) is clearly different from an amine (as contained in the first and second solvents of the present invention).

It appears from the Examiner's comments in numbered section 4 of the Office Action that the Examiner is taking the position that, in Pounds et al., the reaction

product may contain some unreacted amines. Whether or not this the case, clearly there is no disclosure in Pounds et al. that the reaction product, whether or not it has some unreacted amines and is contacted with natural gas with unreacted amines, should have between 20 and 95% by weight of amine so as to obtain H<sub>2</sub>S-depleted gas and in H<sub>2</sub>S-latent solvent.

On page 6 of the office action, the Examiner continues to allege that "it would have been obvious to select an optimum amount of amine in either step including 20-95% by weight because Pounds discloses a single circuit any concentration and about 85% (see abstract and column 6, lines 18-20)." However, column 6, lines 18 to 20 of Pounds et al. does not disclose performing contact with an amine concentrated at about 85%. This paragraph merely teaches the initial concentration of the amine solution which will react with a solution containing 40% ethanedial in water (see column 6, lines 11 to 15).

A second difference between the present invention and the process of Pounds et al. is that Pounds et al performs only a single contact whereas, according to our invention, the gas is contacted with a first solvent then with a second solvent (different from the first solvent as set forth in claims 17-20) to dehydrate the gas. According to the present invention, the second solvent absorbs the water contained in the gas. The Pounds et al. patent does not give any motivation to perform a second contact to dehydrate the gas. Further, Pounds et al. does not suggest using a specific solvent, i.e., a solvent comprising more than 90% weight of amine in order to absorb the water.

The Pounds et al. patent contains no suggestion to perform this second contact with a solvent comprising more than 90% by weight of amine. In particular,

the Pounds et al. patent does not mention nor would it have suggested the capacity of water absorption of a solvent comprising more than 90% by weight of amine.

The Examiner alleges that the disclosure in Pounds et al. "Since hydrogen sulfide is corrosive in the presence of water and poisonous in very small concentrations, it must be almost completely removed from natural gas streams before use" suggests to perform a second contacting to remove water from natural gas. Applicants disagree with this allegation.

Firstly, this sentence concerns only the removing of H<sub>2</sub>S and not the dehydration of natural gas. The new and inventive feature of dehydrating a natural gas with a solvent comprising at least 90% by weight amine is not suggested by Pounds et al.

Secondly, the Examiner does not discuss the specific composition of the second solvent presently claimed, i.e., a solvent comprising at least 90% by weight of amine. The high amine content of the second solvent confers to the second solvent the capacity of absorbing water. Such is neither disclosed nor suggested by Pounds et al.

The Examiner argues that "Pounds discloses a single circuit any concentration and about 85%." The Examiner's extrapolation of this alleged teaching to a suggestion to perform a second contact to dehydrate the gas using a specific solvent, i.e., a solvent comprising more than 90% weight of amine in order to absorb the water is completely without basis in the prior art and is merely a hindsight reconstruction based on the teachings in applicants' specification. The second contact is not suggested nor is "85%" suggestive of "more than 90%."

Moreover, the Pounds et al patent does not contain any teaching or suggestion for regenerating the scavenging compounds. The paragraph at lines 21

to 32 of column 6 of Pounds et al concerns only the reaction of monoethanolamine with ethanedial and can not be interpreted as a step of regeneration. The paragraph bridging columns 1 and 2 concerns merely the prior art and state vaguely that "many processes... regenerate... the sweetening compositions involved." Therefore, the Examiner's assertions go beyond the technical teachings of Pounds et al.

Further, the specific steps of regeneration mentioned in claims 4 to 7, i.e. steps c) and d) providing a first regenerated solvent recycled to stage a) and a second regenerated solvent comprising at least 90% amine recycled to stage b), is clearly not disclosed and would not have been suggested by Pounds et al.

For the foregoing reasons, the presently claimed invention is neither disclosed nor suggested by Pounds et al.

Claim 16 stands rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Pounds et al. in view of U.S. Patent 5,622,681 to Grierson et al. Applicants again traverse this rejection and request reconsideration thereof.

The deficiencies of Pounds et al. are noted above.

The Grierson et al. patent discloses a dialysis separation of heat stable organic amine salts in an acid gas absorption process. While the Grierson patent discloses that methyldiethanolamine is an example of an alkanolamine compound, the teachings of Grierson et al. would not have remedied the basic deficiencies noted above with respect to Pounds et al. Even if one of ordinary skill in the art were to use the compounds disclosed in Grierson in the process of Pounds et al., it is noted that the Pounds et al. patent discloses contacting the gas with the reaction product of a dialdehyde and an alkanolamine, not the alkanolamine itself, and certainly not a first solvent comprising between 20 and 98% by weight in amine and a second

solvent comprising at least 90% by weight amine. Accordingly, claim 16 is patentable over the proposed combination of references.

In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all of the claims now in the application are requested.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 612.43291X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Alan E. Schiavelli  
Registration No. 32,087

AES/at  
(703) 312-6600